

Low-carbon technology challenges for major developing countries

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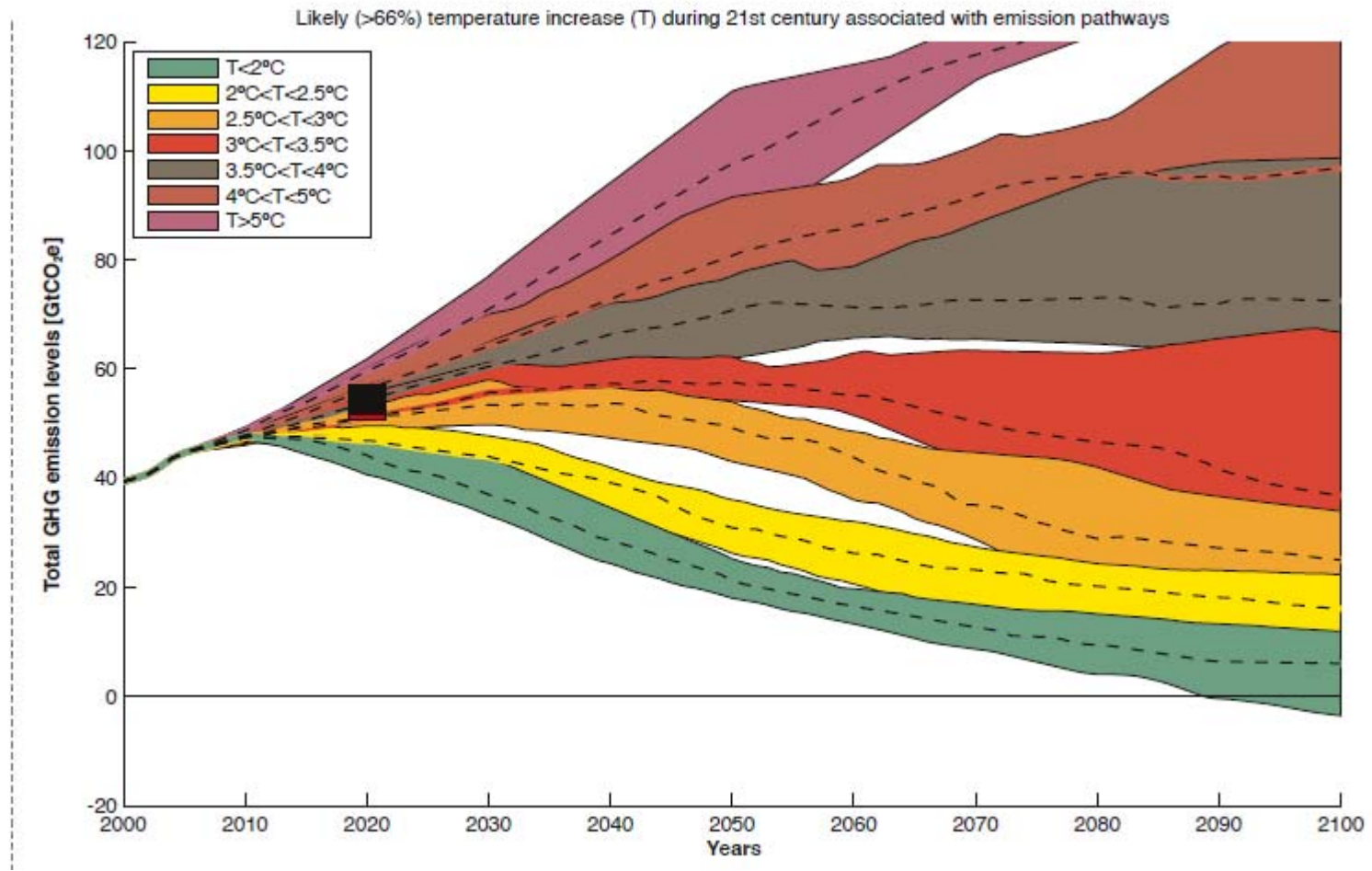
PPE/COPPE/Federal University of Rio de Janeiro

UN Workshop 1 – Technology needs of developing countries and options to address them

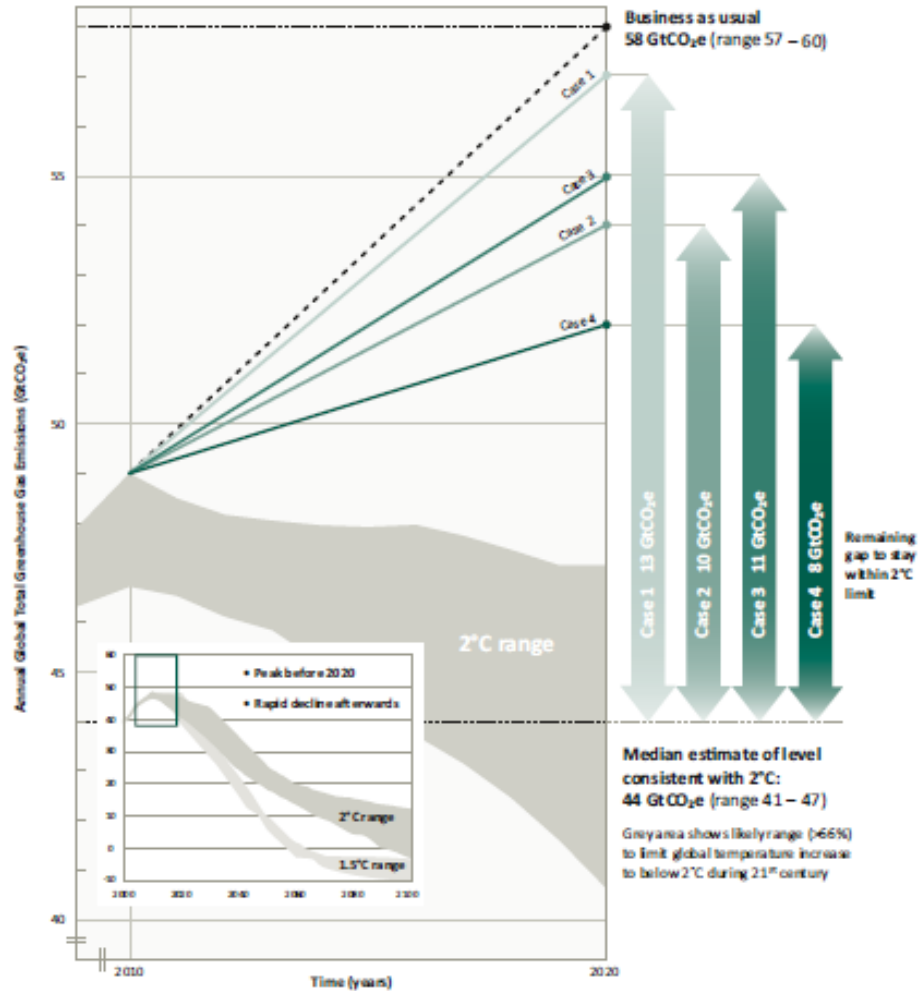
Section 1.2: Science and technology needs and options in addressing sustainable development objectives and global sustainability challenges

United Nations Headquarters, New York, 30 April 2013

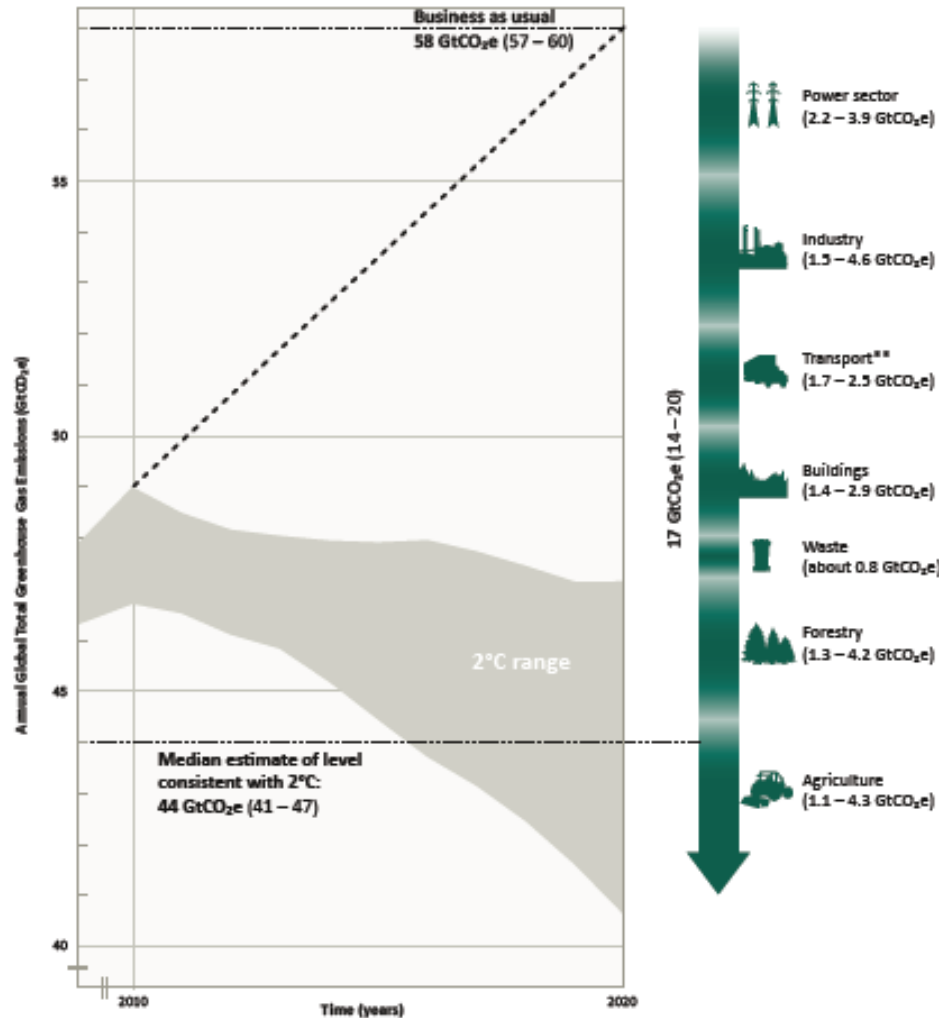
Ranges of passways limiting global temperature increases (UNEP, 2012)



The emissions gap (UNEP, 2012)



How to bridge the gap (UNEP, 2012)



*based on results from Bridging the Emissions Gap Report 2011

**including shipping and aviation

Setting the problem

- If governments are to respond effectively to the challenge of climate change, they will need to ramp up their support for innovation in low-carbon technologies and make sure that the resulting developments are diffused and adopted quickly
- Yet for the developed world, there is a tension inherent in these goals: developed countries' interests in encouraging the spread of technology can clash with their efforts to strengthen their own economies
- Of particular importance is the spread of low-carbon technologies to the major emerging economies: Brazil, China and India

Linking technology development to deployment

- The relationship between efforts to develop low-carbon technologies and efforts to deploy them is complex, uneven, and varies by country
- Some developing countries may pursue a low-carbon technology strategy that is driven largely by a desire to field world-leading clean energy industries
- Yet this does not necessarily mean that these same technologies will be deployed domestically

Linking technology development to deployment (cont.)

- Other developing countries may prioritize addressing local domestic challenges or scarcities over enhancing their own competitiveness in low-carbon technologies
- And as a result they may be more open to foreign technology
- However, low-carbon energy R&D typically requires long-term horizons, while most of industry's focus is on incremental improvements



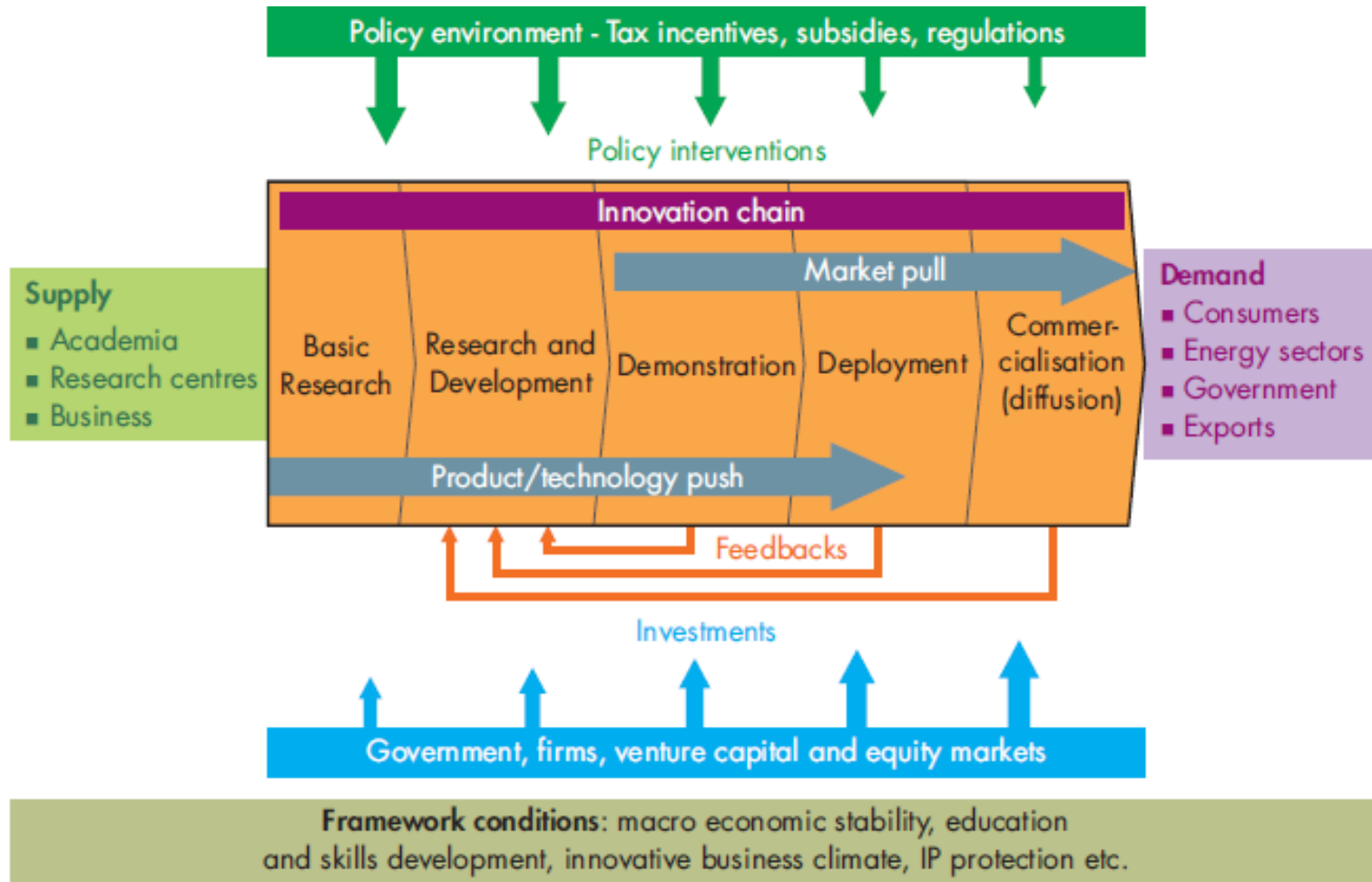
Government policies

- We need to better understand how emerging countries' policies affect their ability to absorb foreign technology
- This means we need to better understand how these countries create markets, invest in innovation, protect intellectual property rights (IPR), and erect trade and investment barriers

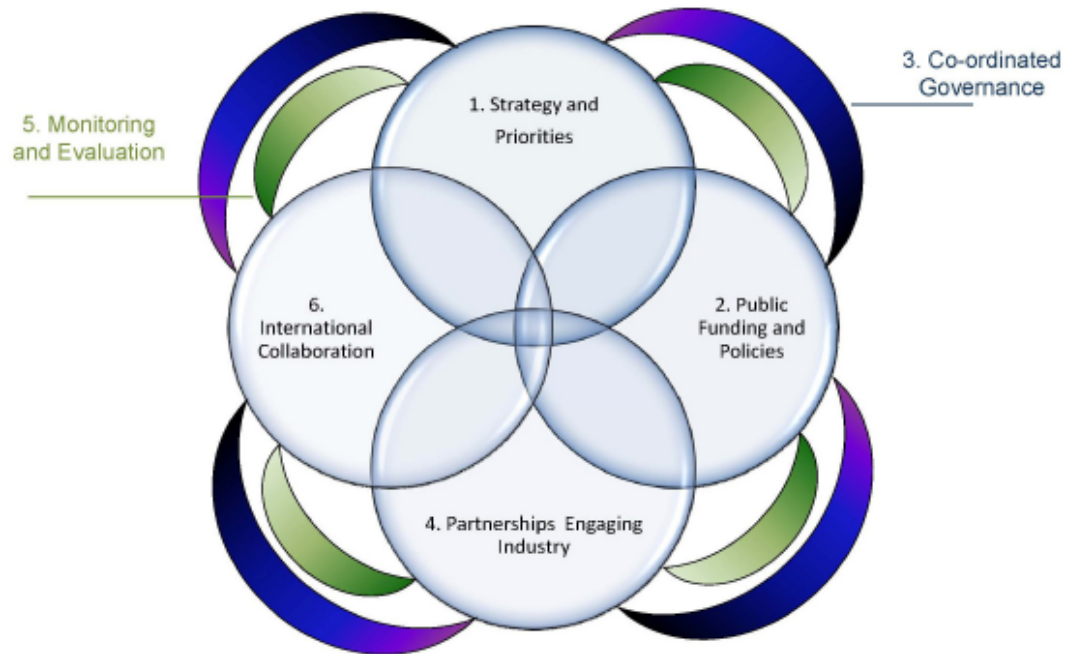
Industrial structure

- The overall economic structure of each major emerging economy has significant consequences for the scale and speed of technology transfer and diffusion
- Whether the economy is dominated by large state-owned enterprises, or whether the landscape is dominated by large private conglomerates
- It is also important to know whether or not there is a disconnect between research, largely done in academia in some of these countries, and the productive sector
- Even if state institutions have stepped in to finance more innovation, which is normally the case

Schematic of the innovation system



RD&D policy framework based on good practices



1. Coherent energy RD&D strategy and priorities
2. Adequate government RD&D funding and policy support
3. Co-ordinated energy RD&D governance
4. Strong collaborative approach, engaging industry through public private partnerships (PPPs)
5. Effective RD&D monitoring and evaluation
6. Strategic international collaboration

Source: IEA.

Final remarks

- The split between developed and developing countries is only an economic distinction
- Not mandatorily this distinction has to be valid for research, development, demonstration and diffusion of technologies
- The real truth is that technology requires a systemic approach that addresses all stages of the technology development process

Final remarks

- There is a multitude of attributes and drivers of innovation, including new knowledge, knowledge depreciation, economies of scale, linkages and spillovers to other sectors
- Emerging economies already play an important role in the technology innovation system and are making significant investments in RD&D
- Alignment and consistency of policies are important for fostering a technology innovation system
- Particularly when it comes to low-carbon technologies, as our emissions gap is increasing dangerously

The Case of Brazil

Linking technology development to deployment: the case of Brazil

- Brazil has been focusing more on addressing domestic challenges— mostly energy (including biofuels and the oil sector), agriculture, and deforestation—than on building new low-carbon industries
- Emphasis often places political importance on using domestic resources to solve these challenges
- As such, Brazil's ability to solve emissions problems with domestic technology is an important contributor to its willingness to confront those problems in the first place

Government policies: the case of Brazil

- Creating markets for low-carbon options can promote innovation and technology transfer as firms seek to meet demand
- Brazil has pursued strong efforts but only in targeted areas, most notably ethanol and agriculture, and more recently renewable energy in general and wind energy in particular
- Brazil boasts a state-led innovation system but, when it comes to low-carbon technology, it focuses mostly on first-generation ethanol and on agriculture, while innovation at the cutting edge, such as in second-generation biofuels, is limited (CCS in the oil sector may be an exception)

Industrial structure: the case of Brazil

- For decades Brazil has attracted large multinational corporations and, with them, important technologies
- Yet there are structural limitations to Brazil's ability to create and absorb technology
- Also, Brazil has faced challenges commercializing inventions: while it is a recognized leader in clean energy such as biofuels or even deep-water oil drilling, it has made less progress developing widely adopted products in other areas

Industrial structure: the case of Brazil

- To some extent this may be a result from the disconnect between science and technology in Brazil, as much more emphasis has been given to basic research rather than to technologies, processes and products
- This can be easily perceived by the recent increase in academic production from Brazil, which has not been accompanied by a similar increase in the production of patents